APPENDIX B.

Report of the Levels and Soundings taken on the Pequest River, in Warren County, by Prof. Ed. A. Bowser,

A bench, named first bench, was made on a maple tree on the right bank of the Pequest, 2,286 yards below Vienna, at the entrance of a valley running up towards Danville Church. The datum plane was assumed ten feet beneath this bench. A line of levels was run from this bench up the Pequest to Adam's Bridge, and also up Trout Brook to Trout Brook Bridge, and benches established at all the bridges and at intermediate points. The heights along the surface of the river were obtained by leveling from these benches. The heights along the bottom were determined by sounding in the channel, and substracting the depths from the heights of the surface. The heights of the points, both along the surface and the bottom of the river, were measured from the datum plane ten feet beneath the first bench.

By inspection of the profile, we see that the bed of the river, from first bench to Steam-mill Bridge, has a rise of ten feet, while the rise from first bench to the bed of the river, one hundred and ten yards above Steam-mill Bridge, is only four and a half feet, making the bed of the river at the latter place five and a half feet lower than it is just below Steam-mill Bridge.

The water in the river just below the Steam-mill Bridge, on April 14th, 1870, was three feet deep, while one hundred and ten yards above the bridge it was eight and a half feet deep,

and two and a half feet deep on the surface of the meadows. If the bottom of the river, from the point one hundred and ten yards above the bridge where the water was eight and a half feet deep, could be made to have a fall sufficient to give the water a velocity of at least one and a half feet per second, its surface would be kept five feet lower than it is possible to keep it with the present reef at and below the bridge. If this had been the bottom on April 14th, the water surface, being five feet lower, would at that time have been two and a half feet below the banks.

By applying the "New Formula" used by Captain Humphrey and Lieutenant Abbott in their investigations on the Mississippi, we find that, in a stream the size of the Pequest on April 14th, a fall of one foot per mile would give it the above mentioned velocity of one and a half feet per second.

The grade line on the profile represents this new bed from the bottom of the river one hundred and ten yards above the Steam-mill Bridge, down towards first bench, with a fall of one foot per mile. It will be seen that at the Steam-mill Bridge the grade is eight and three-tenths feet above the datum plane and five and a half feet below the bed of the river, which is rock. At the first bridge above Vienna, the grade is four and three-tenths feet below the present bed of the channel—the latter rock—and continues from two to five feet below the bed of the river for three hundred yards. Just below Vienna Bridge is another reef three feet above the grade. Between Steam-mill Bridge and the first bridge above Vienna, there is considerable loose earth and some rocks, besides the three reefs, varying from one to three feet deep to the grade line.

It will be seen that the grade does not run below the bed of the channel between Vienna Bridge and first bench, while it reaches the latter five feet above the datum plane, or one

and one-third feet above the present bed of the channel. Thus we see that the reef at Steam-mill Bridge can be cut down five and one-half feet, and the bed of the channel from that point down have a fall of one foot per mile, without any cutting below Vienna Bridge. This will be equivalent to removing a dam from Steam-mill Bridge, five and one-half feet in height.

The grade line on the profile, with a rise of one foot per mile, reaches Long Bridge eighteen feet above the datum plane, and five feet below the bed of the river. Although the Pequest above the Steam-mill Bridge, after the bed below the bridge is cut down to the grade, will have *fall* enough, yet the present channel is entirely too *shallow* to carry off the water. For this reason it will be necessary to cut it down to the grade line, which is from two to five feet below the present bed. The river will then be deep enough to carry off the water without overflowing its banks, and still have a fall of one foot per mile. As the bottom of the river along this meadow is mostly mud and sand-bars, it will not be difficult to make it two or three feet deeper. From Long Bridge up to Adams' Bridge, the rise is five feet; from Long Bridge to Trout Brook Bridge, it is six feet. A fall of three feet per mile can be obtained here, and the channel dug deep enough to keep the land dry.

PROPOSED CUT-OFF.

The profile of the "cut" from the Pequest, one hundred and ten yards above the Steam-mill Bridge, through by Danville Church to the Pequest at first bench, and also that of the branch cut striking the Pequest four hundred yards above first bench, represents the heights along the surface of the ground above the same datum plane that the heights on the river are referred to.

The grade, represented in the profile, leaves the Pequest at a point one hundred and ten yards above the Steam-mill

Bridge, and eight and one-third feet above the datum plane, —which, it will be seen, is in the grade line drawn in the profile of the river—and, with a fall of two feet per mile, reaches the Pequest at first bench five and six-tenths feet above the datum plane; or, by the branch cut, reaches the river five and ninth-tenths feet above the datum plane. Both of these routes were leveled for the purpose of ascertaining which would be the most favorable one for the "cut" that the citizens of Danville and Vienna have talked of for some time as being more favorable to the draining of the Great Meadows than the present channel of the river.

By reference to the profiles it will be seen that the cut to the first bench will be fifty six feet deep at the highest point, and the other forty-nine feet; and that the latter is shorter than the former by seven hundred and fifteen feet.

With a cross section of thirty feet bottom, and a slope of three base to two rise the excavation in these cuts down to the grade line will be as follows:

	Cubic Yards.
From one hundred and ten yards above Steam-mill Bridge to junction of cuts	77,365
From junction of cuts to first bench	232,511
" " " river four hundred yards above first bench	187,296
Total excavation from one hundred and ten yards above Steam-mill Bridge to first bench	309,876
Total excavation from one hundred and ten yards above Steam-mill Bridge to point four hundred yards above first bench	264,661

With the same cross section of thirty feet base, the amount of excavation in the present channel of the river between first bench and the point one hundred and ten yards above Steam-mill Bridge will be:

	Cubic Yards.
Excavation in rock on the three reefs	13,363
" " loose earth	10,641
Total excavation in rock and and loose earth between first bench and one hundred and ten yards above Steam-mill Bridge	24,204

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3,363
0,641
24,204

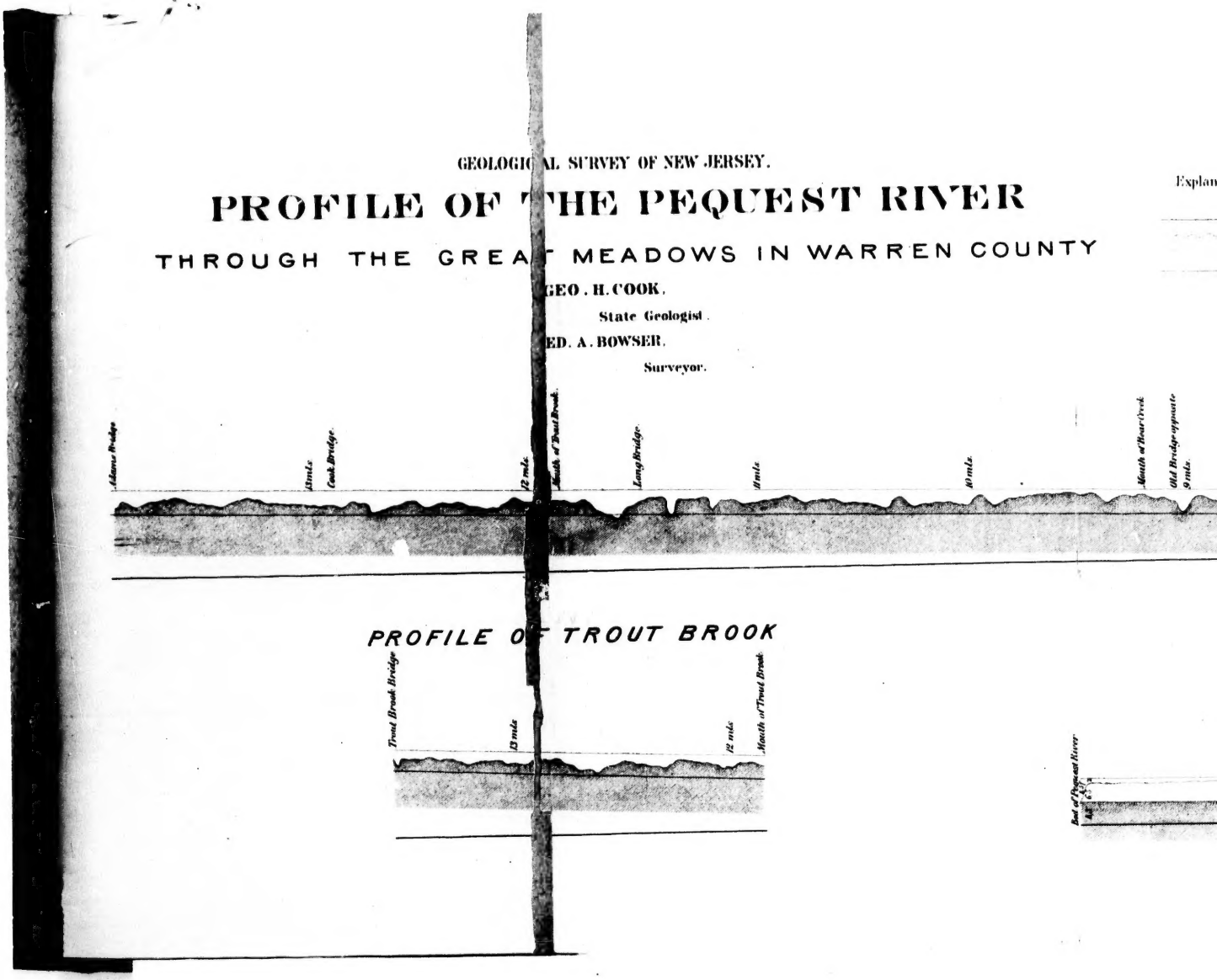
GEOLOGICAL SURVEY OF NEW JERSEY.

PROFILE OF THE PEQUEST RIVER

THROUGH THE GREAT MEADOWS IN WARREN COUNTY

GEO. H. COOK,
State Geologist.

ED. A. BOWSER,
Surveyor.



R

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Explanation of lines on the profiles of the River in the order of their succession

High water April 20 1850

Bed of the River

Grade line 4 feet per mile

Datum Plane 40 feet under 1st Bench

Scale.

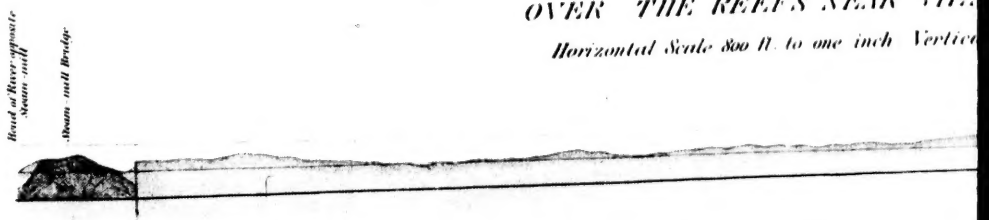
Horizontal 2 inches to 1 mile

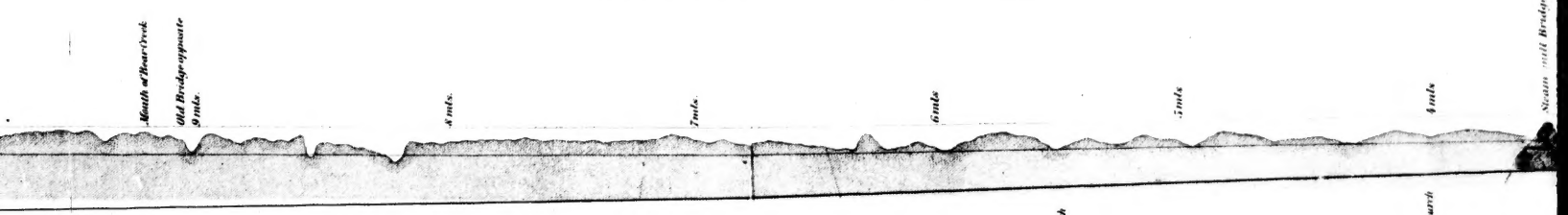
Vertical 40 feet to 1 inch

PROFILE OF PEQU

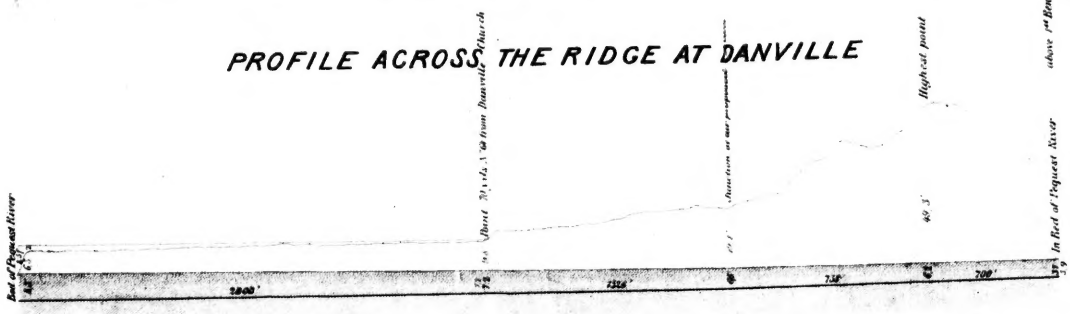
OVER THE REEFS NEAR VIE

Horizontal Scale 800 ft. to one inch Vertic





PROFILE ACROSS THE RIDGE AT DANVILLE



PROFILE

Y.

EST RIVER

IN WARREN COUNTY

Explanation of lines on the profiles of the River in the order of their succession

High water April '20 '50

Bed of the River

Grade line 4 feet per mile

Datum Plane 40 Feet under 1st Bench

Scale.

Horizontal 2 inches to 1 mile

Vertical 40 feet to 1 inch

Head of River opposite Steam mill *Steam mill Bridge*

OVER

Horizonta

10 mls. *Mouth of Bear Creek* *Old Bridge opposite* *9 mls.* *8 mls.* *7 mls.* *6 mls.* *5 mls*

K

PROFILE ACROSS THE RIDGE AT DANVILLE

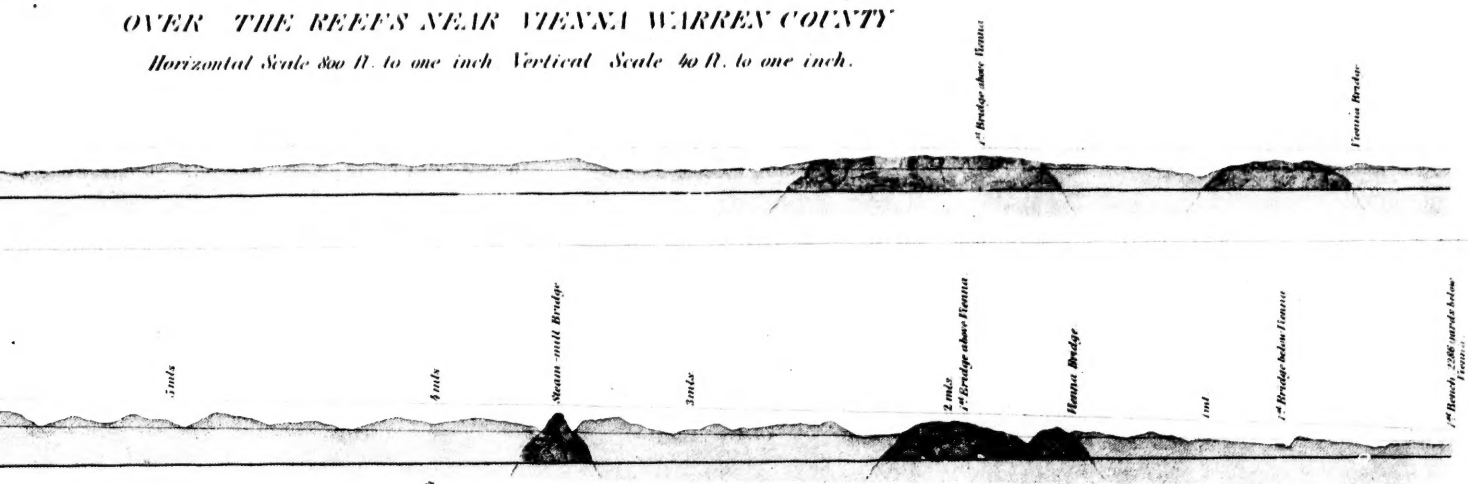
Bed of Pequest River *Mouth of Short Brook 3/4 from Danville Church* *Junction of the proposed* *Highest ridge* *In Bed of Pequest River above 1st Bench*

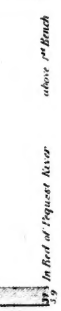
2000' 1320' 720' 700'

PROFILE OF PEQUEST RIVER

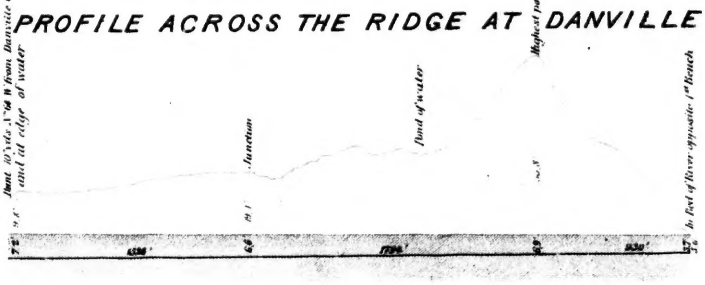
OVER THE REEFS NEAR VIENNA WARREN COUNTY

Horizontal Scale 800 ft. to one inch Vertical Scale 40 ft. to one inch.





PROFILE ACROSS THE RIDGE AT DANVILLE



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This will give the channel from Steam-mill Bridge down, a fall of one foot per mile, while the amount of excavation in the proposed "cut" from the same point one hundred and ten yards above Steam-mill Bridge through by Danville Church to the Pequest at the upper point four hundred yards above first bench will be 264,661 cubic yards, or more than ten times the amount in the river. And I do not think there is any reason to conclude that, in either cut, there will be found less rock than in the river. Yet the "cut" will drain the swamp no deeper than the river in its present channel, if the latter be cut down to the grade line. It would seem then from the above that the cheapest plan to drain the Great Meadows, and the one that will make the drainage thorough, is to cut down the present river bed to the grade represented in the profile.

By reference to the *map* of the Great Meadows, it will be seen that very much cutting can be saved by straightening the Pequest, in many places, between the Steam-mill Bridge and Long Bridge. The area of the swamp is about 5500 acres. The soil is a black muck. The figures on the map denote the depth of the muck down to a sand or gravel bottom. When properly drained, the Great Meadows will be far the most valuable land in that section of country.

The chief expense of this improvement will be in cutting through the rocks at the reefs which may cost $20,000.